МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ МІСЬКОГО ГОСПОДАРСТВА імені О. М. БЕКЕТОВА

МЕТОДИЧНІ ВКАЗІВКИ

для практичних завдань
з дисципліни

«ІНОЗЕМНА МОВА»

(англійська мова)

(для студентів 1 курсу заочної форми навчання освітньо-кваліфікаційного рівня бакалавр напрямів підготовки 6.060103 «Гідротехніка (Водні ресурси)» та 6.060101 «Будівництво» (професійне спрямування «Водовідведення та водопостачання»))

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CONTENT

INTRODUCTION

These educational materials are designed for the ESP students of the 1st year of studies of the speciality “Water Supply and Distribution” to develop their knowledge and skills in technical English according to their profession.

This manual is based on the authentic texts from different sources concerning water supply and distribution problems. It contains the tasks for reading and translation, speaking, writing, vocabulary tasks, texts and tasks for summarizing. The manual consists of 4 units.

Each unit contains:

- pre-reading activity
- an authentic text for reading and translation;
- comprehension exercises;
- exercises for memorization and mastering key vocabulary;
- texts for summarizing.

UNIT 1
EDUCATIONAL SYSTEMS IN DIFFERENT COUNTRIES

Higher Education in Ukraine.

Read and translate the following words:

Recognize, prepare, realize, human, potential, enrich, society, various, technology, economics, specialized, scientific, knowledge, research, bureau, excellent, facilities, industry, agriculture, exist, include , receive, accommodation, extra-mural, to provide educational facilities.

Higher education is generally recognized as preparing individuals to realize more fully their human potential, enrich their understanding of life and make them more productive to society.

Future specialists in various fields of science, technology, economies and art get a fundamental general and specialized training, all students regardless of their specialty study foreign languages.

Apart from educational work and schooling, Ukrainian higher schools carry out a great deal of scientific work in all branches of knowledge. They have either a students' research Society (Club) or a Technological Design Bureau which provide excellent facilities for young researches.

Our country needs specialists in all fields of science and all branches of industry and agriculture. Institutes exist not only in big cities like Kyiv, Kharkov, Lvov, but also in many towns of Ukraine like Irpin.

Higher educational establishments of our country fall into three main types. The first type includes the universities and institutes where there are only full-time students, which receive state grants. Students who do not live at home get accommodation in the hostels.

The second and third types of higher schools provide educational facilities for factory and office workers who combine work with studies. The second type of higher education in establishments includes evening faculties and evening higher schools for those who study in their spare time.

The third type covers extra-mural higher schools where students take correspondence courses. Every year extra-mural students receive from 30 to 40 days' leave to prepare for their exams.

The diplomas by the evening faculties and extra-mural higher schools have the same value as the diplomas of all other institutes and universities.

The period of study at higher schools is from 4 to 6 years. According to the subjects studied there exist three groups of higher schools' universities, polytechnic and specialized institutes.

1. Find the Ukrainian equivalents in the right — hand column for the following:

1. human potential	1. вільний від роботи час

2. apart from	2. існувати
3. in all branches of knowledge	3. поряд з
4. higher educational establishment	4. людський потенціал
5. to fall into	5. працівники контор
6. to get accommodation	6. розпадатись на
7. office workers	7.отримувати помешкання
8. spare time	8. мати однакову вартість
9. extra – mural higher schools	9. вищий навчальний заклад
10. to have the same value	10. в усіх галузях знань
11. to exist	11. заочні вищі школи

2. Complete the following sentences:

1. All students regardless of their speciality study .....
2. Ukrainian higher schools carry out a great deal of .....
3. Higher educational establishments of our country fall into .....
4. Students who do not live at home get .....
5. Extra – mural students receive from 30 to 40 days' .....
6. According to the subjects studied there exist .....

3. Fill in the gaps in the sentences:

1. Future specialists in various fields of science, technology, economies and art get a fundamental _____ and _____ training.
2. Ukrainian higher schools _____ a great deal of scientific work in all branches of knowledge.
3. Higher educational establishments of our country _____ three main types.
4. The first type includes the universities and institutes where there are only _____ _____ which receive state grants.
5. Evening schools are for those who study in their _____ time.
6. The diplomas by the evening faculties and extra-mural higher schools have _____ _____ as the diplomas of all other institutes or universities.

4. Translate the following sentences into English:

1. В нашій Академії студенти можуть отримати ґрунтовну загальну та спеціальну (фахову) підготовку.
2. Незважаючи на спеціалізацію, всі студенти нашої академії вивчають іноземну мову.
3. За короткий період існування академії нашими викладачами та студентами було виконано значний обсяг наукової роботи в сфері економіки та оподаткування.
4. Багато робітників та службовців поєднують роботу з навчанням.
5. Третій тип охоплює вищі навчальні заклади, де студенти навчаються заочно.
6. Період навчання в вищій школі триває від 4 до 6 років.

5. Answer the following questions:

1. Does higher education help to develop your human potential and enrich your understanding of life?
2. What training do the future specialists get?
3. What can you say about the role of foreign languages in gaining higher education?
4. What is the role of scientific work in training future specialists?
5. What specialists does our country need?
6. Where do institutes and universities exist in our country?
7. How many types of higher educational establishments so we have in our country?
8. What higher schools does the first type include?
9. Which is the second type?
10. What schools does the third type cover?
11. What do extra-mural students receive every year?
12. Is there any difference between the diplomas by the evening faculties, extra-mural schools and full-time schools?
13. How long does the period of studies at higher schools last?
14. What groups of higher schools exist?

6. Make up a summary of the text.

Types of HEIs

Read and translate the following words:

conservatoires, multi-disciplinary establishments, accreditation, research fields, outstanding performance, specific occupations, immovable property, educational-proficiency level, expansion of the professional profile, public presentation and scientific debates, research and methodological centres

There are six types of higher education institutions in Ukraine: universities, academies, institutes, conservatoires, colleges and technical schools.

Universities have fourth level of accreditation and may be multi-disciplinary establishments or 'branch' establishments (focused on some particular professional field (Technical, Medical, Agricultural, Pedagogical, Economics, etc.)). They act as leading research and methodological centres in both fundamental and applied research.

Academies have fourth level of accreditation. Their educational provision is concentrated in a specific branch of knowledge in which they also act as leading research and methodological centres in both fundamental and applied research fields.

Institutes have third and fourth level of accreditation. Their educational provision is concentrated in a specific branch of knowledge in which they also

conduct research and methodological research in both fundamental and applied fields. They may be independent or a sub-unit of a university or academy;

Conservatoires have third and fourth level of accreditation. Their educational provision is concentrated in culture and the arts, specifically music. They also conduct research and act as leading centres in the areas of their activity.

Colleges have second level of accreditation largely related to the provision of training leading to the acquisition of specific higher education qualifications. They may also constitute sub-units within higher education establishments with third and fourth level accreditation.

Technical Schools have first level of accreditation. They carry out educational activity leading to specialist areas of knowledge and skills related to specific occupations. They may also constitute sub-units within higher education establishments with third and fourth level accreditation.

Higher education institutions with 4th accreditation level may be bestowed the status of 'National' for outstanding performance in research and scientific activity. This status brings with it added powers in relation to immovable property, facilities, enterprises, institutions and other structural sub-units of the HEI; the award of professorial status; and 'symbiotic' and material incentives and rewards for employees of the HEI. In addition, it also accrues an additional budget for research activities.

In Ukraine Postgraduate education is regarded as specialist education and professional training commencing after the Specialist, Master phase. The Law of Higher Education and the Law on Education regard Post-Graduate education as specialized education and professional training on the basis of the previously obtained educational-proficiency level and experience of the practical work. It is defined as retraining, specialization within a profession; expansion of the professional profile; probation within a profession, i.e. post-qualifying education or continuous professional development. The system of Postgraduate training serves as a ground for lifelong learning.

At doctoral level Ukraine has a two-degree system. The first qualification is the Candidate of Sciences which normally requires at least three years of study after the award of the Specialist or the Master diploma and is achieved by submitting and defending a thesis (dissertation), as well as following post-graduate studies in the specialist field. The second qualification is the Doctor of Sciences, the highest degree in Ukraine which is achieved by dissertation that must make an original contribution to a given field of learning, and after a period of further studies following the award of Candidate of Sciences degree.

Doctoral study programs can be opened in higher education institutions of the third and fourth levels of accreditation or in research institutes and their branches.

The two doctoral degrees can be earned in two ways: as a result of studies or independently. The public defense of the dissertation is held in the form of a public presentation and scientific debates.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. specialized education	a. дослідні інститути
2. research institutes	b.професійний розвиток
3. post-graduate studies	c. нагорода
4. award	d. сфера навчання
5. professional development	e. спеціалізація у професії
6. professional training	f. додатковий бюджет
7. field of learning	g. спеціалізована освіта
8. specialization within a profession	h. публічна презентація
9. an additional budget	i. професійне тренування
10. a public presentation	j. аспірантура

2. Complete the following sentences:

1. There are six types of higher education institutions in Ukraine: .....
2. Universities have .....
3. The Academies' educational provision is concentrated in.....
4. The Institutes' educational provision is concentrated in .....
5. The Conservatoires' educational provision is concentrated in .....
6. Technical Schools carry out .....
7. The status of 'National' is given for .....
8. This status brings with it .....
9. Postgraduate education is regarded as .....
10. The Doctor of Sciences is achieved by .....

3. Answer the following questions:

1. How many types of higher education institutions are there in Ukraine?
2. What are they?
3. Do academies act as leading research and methodological centres?
4. In what fields do Institutes conduct their methodological research?
5. What is the activity of Technical Schools?
6. What is the status of 'National' given for?
7. How the Candidate of Sciences degree is usually achieved?
8. What is the highest scientific degree in Ukraine?
9. How is it achieved?
10. How the public defense of the dissertation is usually held?

4. Make up a summary of the text.

5. Make these sentences interrogative and negative.

1. They listen to the news in the evening.
2. He has spent all his money on books.
3. In summer, we swim in the lake every day.
4. My friend taught at the University.
5. I took a long walk every day.

6. She gets on well with her friends.
7. My parents wanted to buy new furniture.
8. She had cut her hair.
9. The old woman feels very cold.
10. Our father is working in an office and coming home late these days.
11. Our director signed many papers yesterday.
12. The children have been playing all morning and are going to sleep in the afternoon.
13. His brothers had been working hard all his life.
14. He wants to rest in the evening.
15. The postman brings letters three times a day.

Higher Education in Great Britain

Read and translate the following words:

full-time studies, to experience a dramatic expansion, courses of studies, traditional feature, the humanities, government grants, a technologically advanced economy, past-school education, autonomous and responsible, own regulations and courses of studies, traditional arts subjects, the humanities, and science and technology

When higher education of Great Britain is being spoken about the University education is generally meant. However, in fact there is a considerable amount of past-school education, including part-time as well as full-time studies carried on in technical colleges, teacher training colleges, art colleges, institutes of adult education and so on.

Higher education, consisting of degree and equivalent courses, has experienced a dramatic expansion. The number of higher education students in Britain almost doubled between 1979 and 1993 to 1.5 million, so that today around 30 percent of young people enters full-time higher education.

There are some 90 universities, which enjoy academic freedom. Every University is autonomous and responsible to its governing body. The regulations differ from University to University. While there are similarities between them, they all differ from Oxford and Cambridge, where are a number of separate colleges, each with their own regulations and courses of studies. The new, so-called “red-brick” Universities are divided into various faculties: Faculty of Arts, Faculty of Science, Faculty of Social and Economic Studies, etc.

University degree courses are generally being taken for three, four or even five years. University teaching combines lectures practical classes and small group teaching in either seminars or tutorials. The last is a traditional feature of the Universities of Oxford and Cambridge.

First-degree courses are mainly full time and usually last three years, with longer courses in subjects such as medicine. Universities offer courses in a broad range of academic and vocational subjects, including traditional arts subjects, the

humanities, and science and technology. The government encourages young people to choose degree courses in subjects, or combinations of subjects, that provide the knowledge and skills required by a technologically advanced economy.

Over 95 percent of students on first degree and comparable higher education courses receive government grants covering tuition and accommodation and other maintenance expenses. Parents also contribute the amount depending on their income. In addition, students can take out loans to help pay their maintenance costs.

1. Comments:

1. post-school education — освіта, одержана після закінчення школи
2. in fact — фактично, насправді
3. part-time studies — навчання без відриву від виробництва
4. full-time studies — навчання з відривом від виробництва
5. as well as — також, як і
6. to enjoy academic freedom — мати (користуватись) навчальну свободу
7. to responsible to — бути відповідальним перед
8. to take a course — вивчати курс
9. a broad range of academic and vocational subjects — широкий вибір навчальних та професійних предметів
10. humanities — гуманітарні предмети
11. teacher training college — педагогічні інститути
12. to carry on — продовжується, здійснюється
13. to provide knowledge — забезпечувати знання
14. to receive government grants — одержувати пільги від уряду
15. maintenance expenses — витрати на утримання

2. Find the Ukrainian equivalents in the right-hand column for the following:

1. a considerable amount of post-school education	1. бути підпорядкованим керівному органові
2. to experience a dramatic expansion	2. ступеневі навчальні курси
3. to enter full-time higher education	3. пропонувати навчальні курси
4. to enjoy academic freedom	4. поєднувати лекції з практичними заняттями
5. to be responsible to governing body	5. відповідні курси, що дають вищу освіту
6. degree courses	6. значний обсяг після шкільної освіти
7. to combine lectures and practical classes	7. вступати до вищих навчальних закладів з відривом від виробництва
8. to offer courses	8. мати свободу вибору під час навчання

9.	to cover tuition	9. зазнати значного розширення
10.	comparable higher education courses	10. покривати витрати на навчання

3. Use the word combinations given in Ex.1, 2 in the sentences of your own.

4. Complete the following sentences:

1. The post-school education is carried on in .....
2. Higher education has experienced .....
3. Every University is autonomous and responsible to .....
4. University teaching combines .....
5. Universities offer courses in a .....
6. The government encourages young people to .....
7. Parents also contribute the amount .....

5. Say if it is right:

1. Part-time and full-time studies are carried on only at Universities.
2. British higher education consists of degree and equivalent courses.
3. The number of higher education students has increased recently.
4. Every University is autonomous and responsible to its government body.
5. There is great difference between various Universities.
6. University degree is generally being taken for four years.
7. Lectures and practical classes are traditional for teaching at Oxford and Cambridge.
8. First degree courses are both full-time and part-time.
9. Universities offer courses in a broad range of academic and vocational subjects.
10. All students on first degree receive government grant.
11. Students can take out loans to help pay their maintenance costs.

6. Answer the following questions:

1. Describe the system of higher education in Great Britain.
2. What does higher education consist of?
3. What can you say about the increase of higher education students' number?
4. How many Universities are there in Great Britain at present?
5. Whom is each university responsible to?
6. How long are university degree courses taken for?
7. What does university teaching combine?
8. Where is a traditional feature of Cambridge and Oxford?
9. How many years do first degree courses last?
10. What courses does University offer?
11. Whom does the government encourage?
12. Why does the government encourage young people?
13. What do students on first degree receive?
14. What do parents contribute?
15. What can students take out to help pay their maintenance costs?

7. Fill in the blanks with prepositions or adverbs if necessary:

1. There is a demand … a better and more democratic system … education … Great Britain.
2. The students of all the groups are responsible … their dean.
3. The regulations differ … university … university … Great Britain.
4. Our institute is divided … various departments.
5. Our university degree courses are taken … four or five years … Ukraine.
6. The students were speaking … their forthcoming exams.
7. Women as well as men have equal rights … education … our country.
8. I usually go back home … bus. It's much cheaper than going … train.
9. I have to get … the train at the next stop.
10. Let me help you get your things … the car.
11. We can take five people … the car and the others will have to go … the train.
12. I have to get … the train on the next stop.

8. Speak on the text "Higher education in Great Britain"

UNIT 2
WATER AN ITS CHARACTERISTICS

Water

Read and translate the following words and expressions:

a chemical substance, solid state, water vapor, precipitation, surface water, drinkable water, a clear correlation, developing regions of the world, industrial cooling and transportation, water purification

Water is a chemical substance. Its molecule contains one oxygen and two hydrogen atoms connected by covalent bonds. Water is a liquid at ambient conditions, but it often co-exists on Earth with its solid state, ice, and gaseous state, water vapor or steam.

Without water, there would be no life on the Earth at all. It plays an important role in our lives, maybe the most important after air. We all know that the human body consists of 80-85% of water, so we cannot live long without it. All living beings need water to live.

Water covers 70.9% of the Earth's surface, and is vital for all known forms of life. On Earth, it is found mostly in oceans and other large water bodies, below ground in aquifers and in the air as vapor, clouds (formed of solid and liquid water particles suspended in air), and precipitation. Oceans hold 97% of surface water, glaciers and polar ice caps 2.4%, and other land surface water such as rivers, lakes and ponds 0.6%. A very small amount of the Earth's water is contained within biological bodies and manufactured products.

Water on Earth moves continually through a cycle of evaporation or transpiration, precipitation, and runoff, usually reaching the sea. Over land, evaporation and transpiration contribute to the precipitation over land.

Water appears in nature in all three common states of matter and may take many different forms on Earth: water vapor and clouds in the sky; seawater and icebergs in the polar oceans; glaciers and rivers in the mountains; and the liquid in aquifers in the ground.

Scientists think that the life first appeared in the water and then had come out to the land. No one knows this for sure but we all agree that water is necessary for everybody.

In despite of the importance of water humankind continues to pollute it. We all know that there is a lot of water on the Earth, but we also know that there is not much of drinkable water, so we should take care of it. Nowadays people have found many ways to make fresh water out of salty, but still these processes are very difficult and expensive.

Clean drinking water is essential to human and other life forms. Access to safe drinking water has improved steadily and substantially over the last decades in almost every part of the world. There is a clear correlation between access to safe water and GDP per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. A recent report suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%. Water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of freshwater is consumed by agriculture.

There are many different kinds of water purification processes. Mostly in our country, we use the cheapest one, but not the best. In some other small, developed and rich countries like Kuwait, they use more sophisticated ways, like putting a silver surface inside the pipes, to kill bacteria and biological infections which can be very dangerous. As we all understand, we cannot use such technologies just because of their material cost.

There will be many problems if we take down the importance of water. For example, we can learn from the history, in the Middle Ages millions of people died from so-called “Bubonic plague”. And what was the reason for it? The reason was polluted water that spread the disease very fast. Therefore, water can play a very important role in our life, but it can also be dangerous if it is polluter. From the ancient times people used to build their cities and villages near river or lakes so they can have enough supply on water, but then those cities die if they don’t take care of their water.

We may think that there is lots of water on the Earth, and there are lots people who purify it, but we need to think wider and think about the whole planet, let us do our part in water purification! Let us keep the rivers clean so we can drink clean water like in ancient times when it was not polluted!

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. importance of water	a. очищувати воду
2. solid state	b. твердий стан
3. gaseous state	c. промислова продукція
4. manufactured products	d. матеріальна затрата
5. be very dangerous	e. газоподібний стан
6. to take care of water	f. бути дуже небезпечним
7. purify water	g. біологічні інфекції
8. the material cost	h. важність води
9. biological infections	i. прямий взаємозв'язок
10. clear correlation	j. піклуватися про воду

2. Complete the following sentences:

1. Water molecule contains .....
2. Main states of water are .....
3. Water is found mostly in .....
4. Water on Earth moves continually through a cycle .....
5. Water may take many different forms on Earth: .....
6. The processes of making fresh water out of salty are very .....
7. By 2025 .....
8. By 2030 .....
9. Agriculture consumes approximately .....
10. Water can be dangerous if .....

3. Answer the following questions:

1. What are the main physical states of water?
2. Why it is so important for all living things in the world?
3. What is the percentage of water in oceans, glaciers, rivers, lakes and ponds?
4. Describe the process of water cycle.
5. What do scientists think about the first life form on the planet?
6. Is it easy to make safe drinking water?
7. What is the difference between the purification process in poor and rich countries?
8. What was the reason for diseases in the Middle Ages?
9. How did people choose where to build their cities and villages the ancient times? Why?
10. How can we participate in keeping water safe and clean?

4. Complete the following sentences using prepositions and adverbs:

1. Columbus discovered America about six hundred years …….
2. Ghana has been an independent country …… 1957.
3. I'll come round …… 7 o'clock.
4. In Europe we have our weekend break …… Saturday and Sunday, but …… the Middle East the weekend is …… Thursday and Friday.

5. It's our 25th anniversary next month. We were married …… 1986, …… the 17th of September.

5. Replace the infinitive in brackets by the Present Tenses:

1. It (to awake) my interest to economics.
2. She always (to get) good marks in English.
3. My studies (to begin) at half past eight today.
4. I (to think) economy is a promising field.
5. Hard work usually (to lead) to good success.
6. He (teach) Math for twenty-five years.
7. It seemed he (to speak) English quite fluently.
8. Everybody (to know) that they (to watch) TV every evening.
9. The swimming bath (to open) at 9.00 and (to close) at 18.30today.
10. What time (the banks / close) in Britain?
11. The sun (to rise) in the East.
12. Bad students never (to work) hard.
13. It (to snow) for two days.
14. The music (to be) very loud, she (to hear) nothing.
15. My friend (to go) there next week.

5. Make up a summary of the text.

The Major Chemical and Physical Properties of Water

Read and translate the following words:

standard temperature and pressure, transparent, slightly absorbed, electro negativity, vascular plants, against the force of gravity, a good solvent, unusual properties, a low electrical conductivity, density of water, an end-product

Water is a tasteless, odorless liquid at standard temperature and pressure. The color of water and ice is, intrinsically, a very slight blue hue, although water appears colorless in small quantities. Ice also appears colorless, and water vapor is essentially invisible as a gas.

Water is transparent, and thus aquatic plants can live within the water because sunlight can reach them. Only strong UV light is slightly absorbed.

Since the water molecule is not linear and the oxygen atom has higher electro negativity than hydrogen atoms, it carries a slight negative charge, whereas the hydrogen atoms are slightly positive. As a result, water is a polar molecule with an electrical dipole moment. Water also can form an unusually large number of intermolecular hydrogen bonds for a molecule of its size. These factors lead to strong attractive forces between molecules of water, giving rise to water's high surface tension and capillary forces. The capillary action refers to the tendency of water to move up a narrow tube against the force of gravity. This property is relied upon by all vascular plants, such as trees.

Water is a good solvent and is often referred to as the universal solvent. Substances that dissolve in water, e.g., salts, sugars, acids, alkalis, and some gases — especially oxygen, carbon dioxide (carbonation) are known as hydrophilic (water-loving) substances, while those that do not mix well with water (e.g., fats and oils), are known as hydrophobic (water-fearing) substances.

All the major components in cells are also dissolved in water.

Pure water has a low electrical conductivity, but this increases significantly with the dissolution of a small amount of ionic material such as sodium chloride.

The boiling point of water (and all other liquids) is dependent on the barometric pressure. For example, on the top of Mt. Everest water boils at 68 °C, compared to 100 °C at sea level. Conversely, water deep in the ocean near geothermal vents can reach temperatures of hundreds of degrees and remain liquid.

Water has the second highest molar specific heat capacity of any known substance, after ammonia, as well as a high heat of vaporization, both of which are a result of the extensive hydrogen bonding between its molecules. These two unusual properties allow water to moderate Earth's climate by buffering large fluctuations in temperature.

The maximum density of water occurs at 3.98 °C. It has the anomalous property of becoming less dense, not more, when it is cooled down to its solid form, ice. It expands to occupy 9% greater volume in this solid state, which accounts for the fact of ice floating on liquid water.

Water is miscible with many liquids, such as ethanol, in all proportions, forming a single homogeneous liquid. On the other hand, water and most oils are immiscible usually forming layers according to increasing density from the top. As a gas, water vapor is completely miscible with air.

Water can be split by electrolysis into hydrogen and oxygen.

As an oxide of hydrogen, water is formed when hydrogen or hydrogen-containing compounds burn or react with oxygen or oxygen-containing compounds. Water is not a fuel; it is an end-product of the combustion of hydrogen. The energy required splitting water into hydrogen and oxygen by electrolysis or any other means is greater than the energy released when the hydrogen and oxygen recombine.

Elements, which are more electropositive than hydrogen such as lithium, sodium, calcium, potassium and cesium, displace hydrogen from water, forming hydroxides. Being a flammable gas, the hydrogen given off is dangerous and the reaction of water with the more electropositive of these elements may be violently explosive.

Water can dissolve many different substances, giving it varying tastes and odors. Humans and other animals have developed senses, which enable them to evaluate the potability of water by avoiding water that is too salty or putrid. The taste of spring water and mineral water, often advertised in marketing of consumer products, derives from the minerals dissolved in it. However, pure H2O is tasteless

and odorless. The advertised purity of spring and mineral water refers to absence of toxins, pollutants and microbes.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. to avoid water	a. збільшувати щільність
2. a tasteless, odorless liquid	b. невидимій як газ
3. invisible as a gas	c. відсутність токсинів та мікробів
4. strong UV light	d. розчинений у воді
5. dissolved in water	e. формувати гідроксиди
6. consumer products	f. позбавлена смаку та запаху рідина
7. to increase density	g. точка кипіння
8. to form hydroxides	h. уникати води
9. the boiling point of water	i. споживчі товари
10. absence of toxins and microbes	j. потужне ультрафіолетове проміння

2. Say if it is right:

1. Water is a tasteless, odorless liquid at different temperature and pressure.
2. Salts, sugars, acids, alkalis, and some gases can be dissolved in water.
3. Fats and oils are hydrophobic substances.
4. The higher is the point, the lower is the temperature water boils at.
5. Water is a fuel.
6. Animals are able to evaluate the potability of water.
7. The taste of spring water and mineral water, often advertised in marketing of consumer products, derives from the minerals dissolved in it.
8. The taste of spring water and mineral water derives from toxins, pollutants and microbes.

3. Fill in the gaps in the sentences:

1. Water is a ……, …… liquid at standard temperature and pressure.
2. The water molecule carries a …… …… charge.
3. …… is often referred to as the universal solvent.
4. Hydrophilic substances are …….
5. Hydrophobic substances …….
6. …… increases significantly with the dissolution of a small amount of ionic material such as sodium chloride.
7. The boiling point of water is dependent on …….
8. Water can be …… electrolysis into hydrogen and oxygen.
9. Pure …… is tasteless and odorless.
10. Water gives to many different substances various tastes and odors by …..…….

4. Answer the following questions:

1. What are the physical qualities of water?

2. What are the chemical qualities of water?
3. What is the difference between the hydrophilic and hydrophobic substances?
4. Why the boiling point of water and all other liquids is different in various places?

5. Put special questions to underlined words:

1. This artist <u>draws</u> very good pictures.
2. The students of our group know <u>English</u> well.
3. About <u>fifteen thousand</u> students study at our Academy.
4. My sister winded up <u>her watch</u> in the morning.
5. The results of the competition were <u>good</u>.
6. I have just been to <u>the cinema</u>.
7. She <u>is having</u> her breakfast.

6. Rearrange the parts of the sentences to make questions.

1. How many people / to the party / next week / will be coming?
2. Which team / first prize / won / at the weekend?
3. What / when you were late / happened / this morning / for work?
4. Who / next door / lives / to you?
5. How many students / to your English class / come?
6. Whose car / that red one / over there / is?

7. Make up a summary of the text.

Humidity

Read and translate the following words:

miscible with many liquids, homogeneous liquid, increasing density, water vapor pressure, reverse process, room temperature, relative humidity.

Water is miscible with many liquids, for example ethanol in all proportions, forming a single homogeneous liquid. On the other hand, water and most oils are immiscible usually forming layers according to increasing density from the top.

As a gas, water vapor is completely miscible with air. But the maximum water vapor pressure that is thermodynamically stable with the liquid (or solid) at a given temperature is relatively low compared with total atmospheric pressure. For example, if the vapor partial pressure is 2% of atmospheric pressure and the air is cooled from 25°C, starting at about 22°C water will start to condense, defining the dew point, and creating fog or dew. The reverse process accounts for the fog burning off in the morning. If one raises the humidity at room temperature, say by running a hot shower or a bath, and the temperature stays about the same, the vapor soon reaches the pressure for phase change, and condenses out as steam. A gas in this context is referred to as saturated or 100% relative humidity, when the vapor pressure of water in the air is at the equilibrium with vapor pressure due to (liquid) water; water (or ice, if cool enough) will fail to lose mass through evaporation

when exposed to saturated air. Because the amount of water vapor in air is small, relative humidity, the ratio of the partial pressure due to the water vapor to the saturated partial vapor pressure, is much more useful. Water vapor pressure above 100% relative humidity is called super-saturated and can occur if air is rapidly cooled, say by rising suddenly in an updraft.

1. Make up the summary of the text.

2. Match the sentences, which supply present evidence, with the predictions below.

1. They are playing really well.	a. He is going to blow his whistle.
2. I feel awful.	b. It is going to be windy tomorrow.
3. They have invited many people.	c. I think they are going to win.
4. We have a lot to do.	d. They are going to fall asleep.
5. I listened to the weather forecast.	e. They are going to win again.
6. I cannot hang on.	f. I am going to fall.
7. The kids are tired out.	g. It is going to be a hard day.
8. The referee is looking at his watch.	h. I think I am going to faint.
9. Liverpool are three goals ahead.	i. It is going to very crowded.

Water Quality

Read and translate the following words:

biological characteristics, a condition of water, common standards, a health of ecosystems, political and technical/scientific decisions, natural water bodies, to identify the sources and fates of contaminants, an appropriate quality, a perception of water quality, a discharge of treated and untreated sewage.

Water quality is the physical, chemical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose. It is most frequently used by reference to a set of standards against which compliance can be assessed. The most common standards used to assess water quality relate to drinking water, safety of human contact and for the health of ecosystems.

In the setting of standards, agencies make political and technical/scientific decisions about how the water will be used. In the case of natural water bodies, they also make some reasonable estimate of pristine conditions. Different uses raise different concerns and therefore different standards are considered. Natural water bodies will vary in response to environmental conditions. Environmental scientists work to understand how these systems function, which in turn helps to identify the sources and fates of contaminants. Environmental lawyers and policy makers work to define legislation that ensures that water is maintained at an appropriate quality for its identified use.

The vast majority of surface water on the planet is neither potable nor toxic. This remains true even if seawater in the oceans (which is too salty to drink) is not

counted. Another general perception of water quality is that of a simple property that tells whether water is polluted or not. In fact, water quality is a very complex subject, in part because water is a complex medium intrinsically tied to the ecology of the Earth. Industrial pollution is a major cause of water pollution, as well as runoff from agricultural areas, urban storm water runoff and discharge of treated and untreated sewage.

The parameters for water quality are determined by the intended use. Work in the area of water quality tends to be focused on water that is treated for human consumption or in the environment.

Contaminants that may be in untreated water include microorganisms such as viruses and bacteria; inorganic contaminants such as salts and metals; pesticides and herbicides; organic chemical contaminants from industrial processes and petroleum use; and radioactive contaminants. Water quality depends on the local geology and ecosystem, as well as human uses such as sewage dispersion, industrial pollution, use of water bodies as a heat sink, and overuse.

Some people use water purification technology to remove contaminants from the municipal water supply they get in their homes, or from local pumps or bodies of water. For people who get water from a local stream, lake, or aquifer (well), the local government does not filter their drinking water.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. any human need or purpose	a. ризик здоров'ю
2. a complex subject	b. технологія очищення води
3. a local government	c. водоймище
4. a presence of contaminants	d. будь-яка людська потреба та мета
5. water purification technology	e. видалення забруднень
6. protection for public health	f. складний предмет
7. a health risk	g. міське постачання води
8. municipal water supply	h. міській уряд
9. to remove contaminants	i. наявність шкідливих речовин
10. bodies of water	j. охорона громадського здоров'я

2. Match the words with their definitions:

1. ecosystem	a. the level top of something
2. to contaminate	b. remove contaminants from
3. property	c. to add a poisonous or polluting substance
4. surface	d. laws considered collectively
5. sewage	e. the surroundings or conditions in which a person, animal, or plant lives or creates
6. purification	f. a biological community of interacting organisms and their physical environment
7. legislation	g. waste water and excrement
8. environment	h. an attribute, quality, or characteristic of something

9. viruses	i. an infective agent which is too small to be seen by light microscopy
10. bacteria	j. members of a large group of microorganisms including some which can cause disease

3. Say if it is true:

1. Water quality includes the physical and biological characteristics of water.
2. Safety of human contact relates to the most common standards used to assess water quality.
3. Agencies make political and scientific decisions about how to use natural water bodies.
4. Policy makers work to understand how to identify the sources and fates of contaminants.
5. The vast majority of surface water on the planet is pure.
6. Sea water in the oceans is too salty to drink.
7. Water is a complex medium not tied to the ecology of the Earth.
8. Water pollution is caused by discharge of treated and untreated sewage.
9. Organic chemical contaminants are not the only contaminant of water.
10. The local geology and ecosystem have no effect on water quality.

4. Put questions to the underlined words:

1. Bob had come <u>home</u> by 4 o'clock.
2. She gave them her <u>dictionary</u>.
3. He <u>was taking a shower</u> at 7 o'clock in the morning.
4. Ann brought <u>me</u> a new magazine.
5. He left for London <u>on Monday</u>.
6. He opened <u>the window</u> before classes.
7. Ann <u>had been translating</u> foreign letters for all afternoon.
8. I had finished <u>work</u> by five o'clock.
9. He lived in Kyiv <u>three years ago</u>.
10. They <u>were coming</u> home when saw him.

5. Complete the sentences putting the verbs in the Past Simple or the Past Continuous.

1. I (work) upstairs when the accident (happen).
2. He (open) the book and (start) to read.
3. We (enjoy) the film, when suddenly the electricity (go).
4. When she (hear) the news, she (begin) to cry.
5. Everyone (talk) quietly. Suddenly the door (burst).
6. When I (hear) the doorbell, I (run) downstairs.

Environmental Water Quality

1. Read and translate the following words:

vary significantly, different environmental conditions, human uses, toxic substances and high populations, a health hazard, current environmental laws, landscape changes, water contamination, achieving goals, water quality indicators.

Environmental water quality, also called ambient water quality, relates to water bodies such as lakes, rivers, and oceans. Water quality standards vary significantly due to different environmental conditions, ecosystems, and intended human uses. Toxic substances and high populations of certain microorganisms can present a health hazard for non-drinking purposes such as irrigation, swimming, fishing, rafting, boating, and industrial uses. These conditions may also affect wildlife, which use the water for drinking or as a habitat. Modern water quality laws general specify protection of fisheries and recreational use and require as a minimum, retention of current quality standards.

There is some desire among the public to return water bodies to pristine or pre-industrial conditions. Most current environmental laws focus of the designation of uses. In some countries, these allow for some water contamination as long as the particular type of contamination is not harmful to the designated uses. Given the landscape changes in the watersheds of many freshwater bodies, returning to pristine conditions would be a significant challenge. In these cases, environmental scientists focus on achieving goals for maintaining healthy eco-systems and may concentrate of the protection of populations of endangered species and protecting human health.

The complexity of water quality as a subject is reflected in the many types of measurements of water quality indicators. Some of the simple measurements listed below can be made on-site — temperature, pH, dissolved oxygen, conductivity, and Oxygen Reduction potential in direct contact with the water source in question. More complex measurements that must be made in a lab setting require a water sample to be collected, preserved, and analyzed at another location. Making these complex measurements can be expensive. Because direct measurements of water quality can be expensive, ongoing monitoring programs are typically conducted by government agencies. However, there are local volunteer programs and resources available for some general assessment. Tools available to the general public are on-site test kits commonly used for home fish tanks and biological assessments.

Inevitably after events such as earthquakes and Tsunamis, there is an immediate response by the aid agencies as relief operations get underway to try and restore basic infrastructure and provide the basic fundamental items that are necessary for survival and subsequent recovery. Access to clean drinking water and adequate sanitation is a priority at times like this. The threat of disease

increases hugely due to the large numbers of people living close together, often in squalid conditions, and without proper sanitation.

After a natural disaster, as far as water quality testing is concerned there are widespread views on the best course of action to take and a variety of methods can be employed. The key basic water quality parameters that need to be addressed in an emergency are bacteriological indicators of fecal contamination, Free Chlorine Residual, pH, turbidity and possibly Conductivity. There are a number of portable water test kits on the market widely used by aid and relief agencies for carrying out such testing.

Individuals interested in monitoring water quality who cannot afford or manage lab scale analysis can also use biological indicators to get a general reading of water quality.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. ambient water quality	a. бактеріологічні показники
2. to vary significantly	b. різноманітність методів
3. toxic substances	c. провести аналіз у лабораторії
4. basic water quality parameters	d. провести тести
5. necessary for survival	e. значно відрізнятися
6. a variety of methods	f. токсичні субстанції
7. to manage lab scale analysis	g. необхідний для виживання
8. bacteriological indicators	h. базові параметри якості води
9. to carry out the tests	i. якість навколишньої води
10. turbidity	j. мутність

2. Fill the gaps in the sentences:

1. …… vary significantly due to different environmental conditions, ecosystems, and intended human uses.
2. …… and …… of certain microorganisms can present a health hazard.
3. …… purposes are irrigation, swimming, fishing, rafting, boating, and industrial uses.
4. There is some desire among the public to …….
5. …… focus on achieving goals for maintaining healthy eco-systems.
6. Temperature, pH, dissolved oxygen, conductivity are some of …….
7. …… that must be made in a lab setting require a water sample to be collected, preserved, and analyzed at another location.
8. The key …… are bacteriological indicators of fecal contamination, Free Chlorine Residual, pH, turbidity and possibly Conductivity.
9. Access to …… and …… is a priority at times like this.

10. Individuals interested in monitoring water quality …… can also use biological indicators to get a general reading of water quality.

3. Answer the questions:

1. What is water quality standard?
2. Is water for non-drinking purposes exposed to toxic substances and microorganisms?
3. What do the governments do to purify the water bodies?
4. Why adequate sanitation is a priority in our days?
5. What are the simple measurements of water quality?
6. What are the complex measurements of water quality?

4. Put the verb into the correct tense in the Future Tenses:

1. It (rain) heavily on Sunday.
2. My friend (lie) in the sun next summer.
3. I (play) chess with him tomorrow.
4. She (speak) English fluently.
5. He (pay) back the money by next week.
6. She (recognize) his face.
7. She (get) an excellent mark.
8. My parents (wait) for me at the station.
9. You (see) he (to be) right.
10. They (to be) for sure admire her singing.

Water in the Universe

Read and translate the following words and expressions:

a byproduct of star formation, a surrounding gas, within our galaxy, hydrogen, oxygen, abundant elements, vital to the existence of life, a greenhouse effect, a relatively steady surface temperature, an incoming solar radiation

Much of the universe's water is produced as a byproduct of star formation. When stars are born, their birth is accompanied by a strong outward wind of gas and dust. When this outflow of material eventually influences the surrounding gas, the shock waves that are created compress and heat the gas. The water observed is quickly produced in this warm dense gas.

Water has been detected in interstellar clouds within our galaxy, the Milky Way. Water probably exists in abundance in other galaxies, too, because its components, hydrogen and oxygen, are among the most abundant elements in the universe. Interstellar clouds eventually condense into solar nebulae and solar systems such as ours.

Water ice is present on Earth mainly as ice sheets.

The Solar System along center row range of possible habitable zones of varying star sizes.

The existence of liquid water and to a lesser extent its gaseous and solid forms are vital to the existence of life on Earth, as we know it. The Earth is located in the habitable zone of the solar system; if it were slightly closer to or farther from the Sun (about 5%, or about 8 million kilometers), the conditions which allow the three forms to be present simultaneously would be far less likely to exist.

Earth's gravity allows it to hold an atmosphere. Water vapor and carbon dioxide in the atmosphere provide a temperature buffer (greenhouse effect) which helps maintain a relatively steady surface temperature. If Earth were smaller, a thinner atmosphere would allow temperature extremes, thus preventing the accumulation of water except in polar ice caps (as on Mars).

The surface temperature of Earth has been relatively constant through geologic time despite varying levels of incoming solar radiation, indicating that a dynamic process governs Earth's temperature via a combination of greenhouse gases.

There are various theories about origin of water on Earth.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. the universe's water	a. формування зірок
2. a star formation	b. відносно постійний
3. an outflow of material	c. походження води на Землі
4. to compress and heat the gas	d. вода всесвіту
5. the Milky Way	e. Чумацький шлях
6. warm dense gas	f. динамічний процес
7. relatively constant	g. відтік матеріалів
8. a dynamic process	h. теплий щільний газ
9. a greenhouse effect	i. стискати та нагрівати газ
10. origin of water on Earth	j. парниковий ефект

2. Complete the following sentences:

1. When stars are born, their birth is accompanied by .....
2. Hydrogen and oxygen are .....
3. The existence of liquid water on Earth is vital to .....
4. The Earth is located in the .....
5. The conditions which allow the three forms to be present simultaneously would be far less likely to exist if .....
6. Earth's gravity allows it .....
7. If Earth were smaller .....
8. The surface temperature of Earth has been relatively constant through .....

3. Answer the questions:

1. What happens when stars are born?
2. What are the most abundant elements in the universe?
3. What can you say about the Earth location in the solar system?
4. What role do water vapor and carbon dioxide play in the atmosphere?

5. What would happen if the Earth's size was different?

4. Use the verbs below to complete the sentences. Some of the sentences are positive, some are negative, and some are questions:

to accept, to complain, to hire, to place, to realize, to study, to visit.

1. Oh, I'm sorry to disturb you. I …… you had a visitor.
2. …… you …… economics when you were at University?
3. She …… …… because the salary was too low.
4. Last week a number of customers …… about slow service.
5. …… you …… the Acropolis when you were on Greece?
6. I am writing with reference to the order I …… with you last week.
7. At last year's launch party, who …… you …… to do the catering?

5. Make up a summary of the text.

Water on Earth

Read and translate the following words and expressions:

the Antarctic ice sheet, visible at the bottom, distribution, hydrogeology, ecological processes, hydrosphere, Earth's approximate water volume, potentially useful to humans, many geological processes, both chemical and physical weathering processes.

Water covers 71% of the Earth's surface; the oceans contain 97.2% of the Earth's water. The Antarctic ice sheet, which contains 61% of all fresh water on Earth, is visible at the bottom. Condensed atmospheric water can be seen as clouds.

Hydrology is the study of the movement, distribution, and quality of water throughout the Earth. The study of the distribution of water is hydrography. The study of the distribution and movement of groundwater is hydrogeology, of glaciers is glaciology, of inland waters is limnology and distribution of oceans is oceanography. Ecological processes with hydrology are in focus of ecohydrology.

The collective mass of water found on, under, and over the surface of a planet is called the hydrosphere. Earth's approximate water volume (the total water supply of the world) is 1,360,000,000 km^3.

Groundwater and fresh water are useful or potentially useful to humans as water resources.

Liquid water is found in bodies of water, such as an ocean, sea, lake, river, stream, canal, pond, or puddle. The majority of water on Earth is seawater. Water is also present in the atmosphere in solid, liquid, and vapor states. It also exists as groundwater in aquifers.

Water is important in many geological processes. Groundwater is present in most rocks, and the pressure of this groundwater affects patterns of faulting. Water in the mantle is responsible for the melt that produces volcanoes. On the surface of the Earth, water is important in both chemical and physical weathering processes.

Water and, to a lesser but still significant extent, ice, are also responsible for a large amount of sediment transport that occurs on the surface of the earth. Deposition of transported sediment forms many types of sedimentary rocks, which make up the geologic record of Earth history.

1. Match the words with their definitions:

hydrology	water held underground in the soil or in pores and crevices in rock
groundwater	the region of the earth's interior between the crust and the core, believed to consist of hot, dense rocks
ecohydrology	the study of the movement, distribution, and quality of water throughout the Earth
hydrography	water not from the sea
deposition	the study of the distribution of water
hydrosphere	the study of ecological processes with hydrology
aquifers	the collective mass of water found on, under, and over the surface of a planet
mantle	the study of the distribution and movement of groundwater
sediment	a body of permeable rock which can contain or transmit groundwater
oceanography	particulate matter that is carried by water or wind and deposited on the surface of the land and may in time become consolidated into rock
hydrogeology	the study of glaciers
glaciology	the study of distribution of oceans

2. Complete the following sentences:

1. Water covers .....
2. The Antarctic ice sheet contains .....
3. Hydrogeology is the study .....
4. Groundwater is present in .....
5. Water is important in both chemical and physical .....
6. Water is present in the atmosphere in .....
7. Groundwater exists in .....
8. Sedimentary rocks make up .....
9. Hydrography is .....
10. Limnology is .....

3. Answer the following questions:

1. What is a cloud?
2. Which science studies the ecological processes with hydrology?

3. What is the hydrosphere?
4. Why water is important in many geological processes?
5. Is water important on the surface of the Earth? Why?

4. Make up a summary of the text.

5. Here are some phrases people say at parties. Match the statements with the question tags:

1. It's a bit noisy, …	a. …will you?
2. We haven't met before, …	b. …don't you?
3. You are Henry's brother, …	c. …isn't it?
4. Pass this plate round, …	d. …aren't you?
5. Don't drop it, …	e. …will you?
6. You live next door, …	f. …have you?
7. You are not living, …	g. …wasn't it?
8. You can stay a bit later, …	h. …won't you?
9. You'll come again, …	i. …can't you?
10. That was fun, …	j. …are you?

Water Cycle

Read and translate the following words and expressions:

surface water, soil water, water cycle, transfer processes, evaporation, transpiration, precipitation, runoff, calculate water quality parameters, irrigation for agriculture, to shape the environment, the establishment of population centers, a drought.

The water cycle refers to the continuous exchange of water within the hydrosphere, between the atmosphere, soil water, surface water, groundwater, and plants.

Water moves perpetually through each of these regions in the water cycle consisting of following transfer processes: evaporation from oceans and other water bodies into the air and transpiration from land plants and animals into air; precipitation, from water vapor condensing from the air and falling to earth or ocean; runoff from the land usually reaching the sea.

Water runoff often collects over watersheds flowing into rivers. A mathematical model used to simulate river or stream flow and calculate water quality parameters is hydrological transport model. Some of water is diverted to irrigation for agriculture. Rivers and seas offer opportunity for travel and commerce. Through erosion, runoff shapes the environment creating river valleys and deltas, which provide rich soil and level ground for the establishment of population centers. A flood occurs when an area of land, usually low-lying, is covered with water. It is when a river overflows its banks or flood from the sea. A drought is an extended period of months or years when a region notes a deficiency

in its water supply. This occurs when a region receives consistently below average precipitation.

Some runoff water is trapped for periods, for example in lakes. At high altitude, during winter, and in the far north and south, snow collects in ice caps, snow pack and glaciers. Water also infiltrates the ground and goes into aquifers. This groundwater later flows back to the surface in springs or more spectacularly in hot springs and geysers. Groundwater is also extracted artificially in wells. This water storage is important, since clean, fresh water is essential to human and other land-based life. In many parts of the world, it is in short supply.

Seawater contains about 3.5% salt on average, plus smaller amounts of other substances. The physical properties of seawater differ from fresh water in some important respects. It freezes at a lower temperature and its density increases with decreasing temperature to the freezing point, instead of reaching maximum density at a temperature above freezing. The salinity of water in major seas varies from about 0.7% in the Baltic Sea to 4.0% in the Red Sea.

Tides are the cyclic rising and falling of Earth's ocean surface caused by the tidal forces of the Moon and the Sun acting on the oceans. Tides cause changes in the depth of the marine and estuarine water bodies and produce oscillating currents known as tidal streams. The changing tide produced at a given location is the result of the changing positions of the Moon and Sun relative to the Earth coupled with the effects of Earth rotation and the local bathymetry. The strip of seashore that is submerged at high tide and exposed at low tide, the intertidal zone, is an important ecological product of ocean tides.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. a continuous exchange	a. зниження температури
2. at a given location	b. на заданій місцевості
3. a depth of the marine	c. солоність води
4. Earth rotation	d. екологічній продукт
5. at a lower temperature	e. суттєвий для людства
6. an ocean surface	f. глибина моря
7. essential to human	g. обертання Землі
8. a decreasing temperature	h. постійний обмін
9. the salinity of water	i. поверхня океану
10. an ecological product	j. при більш низькій температурі

2. Fill in the gaps in the sentences:

1. …… is the continuous exchange of water within the hydrosphere.
2. A mathematical model used to simulate river or stream flow and calculate water quality parameters is …… model.
3. …… offer opportunity for travel and commerce.
4. The changing tide is the result of ……
5. …… cause changes in the depth of the marine.

6. Oscillating currents are known as …….
7. …… varies from about 0.7% in the Baltic Sea to 4.0% in the Red Sea.
8. …… of sea water differ from fresh water in some important respects.
9. ……. is important, since clean, fresh water is essential to human.
10. …… occurs when a region receives consistently below average precipitation.

3. Answer the questions:

1. Explain what the process of the water cycle is.
2. What is a hydrological transport model?
3. What is the role of rivers and seas in human life?
4. What is a flood?
5. What is a drought?

4. Make up a summary of the text.

5. Change the following sentences into disjunctive questions:

1. They met at the cinema five minutes before the showing began.
2. He took his parents' way.
3. They listened to a wonderful concert last night.
4. He didn't go to the country last summer.
5. He began to work at an early age.

6. Complete these questions with the appropriate question tags.

1. I see, you've crashed the car, ... ?
2. Oh, so you just borrowed it, ... ?
3. You were going to see some friends, ... ?
4. It was only a couple of miles, ... ?
5. You were driving very carefully, ... ?
6. The other car just ran into you, ... ?
7. You forgot to write down the car's number, ... ?
8. Oh, you are very sorry, ... ?
9. And you'll pay for the damage, ... ?
10. And you'll be more carefull next time, ... ?

Effects on Life

Read and translate the following words and expressions:

many distinct properties, organic compounds, to depend on water, to be vital for, metabolic processes, photosynthesis and respiration, to form glucose and release oxygen, to oxidize, to capture the sun's energy, amphibians, algae, underwater ecosystems, obtain oxygen to survive, a wide range of modifications, invertebrate life, an aquatic habitat, new specialization, the so-called cradle of civilization, the ancient society of the Egyptians.

From a biological standpoint, water has many distinct properties that are critical for the proliferation of life that set it apart from other substances. It carries out this role by allowing organic compounds to react in ways that ultimately allow replication. All known forms of life depend on water. Water is vital both as a solvent in which many of the body's solutes dissolve and as an essential part of many metabolic processes within the body. Metabolism is the sum total of anabolism and catabolism. In anabolism, water is removed from molecules in order to grow larger molecules (e.g. starches, triglycerides and proteins for storage of fuels and information). In catabolism, water is used to break bonds in order to generate smaller molecules. Without water, these particular metabolic processes could not exist.

Water is fundamental to photosynthesis and respiration. Photosynthetic cells use the sun's energy to split off water's hydrogen from oxygen. Hydrogen is combined with CO_2 (carbon dioxide) (absorbed from air or water) to form glucose and release oxygen. All living cells use such fuels and oxidize the hydrogen and carbon to capture the sun's energy and reform water and CO_2 in the process.

Earth's surface waters are filled with life. The earliest life forms appeared in water; nearly all fish live exclusively in water, and there are many types of marine mammals, such as dolphins and whales. Some kinds of animals, such as amphibians, spend portions of their lives in water and portions on land. Plants such as kelp and algae grow in the water and are the basis for some underwater ecosystems. Plankton is generally the foundation of the ocean food chain.

Aquatic vertebrates must obtain oxygen to survive, and they do so in various ways. Fish have gills instead of lungs, although some species of fish, such as the lungfish, have both. Marine mammals, such as dolphins, whales, otters, and seals need to surface periodically to breathe air. Some amphibians are able to absorb oxygen through their skin. Invertebrates exhibit a wide range of modifications to survive in poorly oxygenated waters including breathing tubes and gills. However, as invertebrate life evolved in an aquatic habitat most have little or new specialization for respiration in water.

Civilization has historically flourished around rivers and major waterways; Mesopotamia, the so-called cradle of civilization, was situated between the major rivers Tigris and Euphrates; the ancient society of the Egyptians depended entirely upon the Nile. Large metropolises like Rotterdam, London, Montreal, Paris, New York City, Buenos Aires, Shanghai, Tokyo, Chicago, and Hong Kong owe their success in part to their easy accessibility via water and the resultant expansion of trade. Islands with safe water ports, like Singapore, have flourished for the same reason. In places such as North Africa and the Middle East, where water is scarcer, access to clean drinking water was and is a major factor in human development.

1. Match the words with their definitions:

Replication	the process when water is used to break bonds in order to generate smaller molecules

Metabolism	animals who spend portions of their lives in water and portions on land
Anabolism	the action of copying or reproducing something
Catabolism	an animal lacking a backbone
Photosynthesis	the chemical process that occur within a living organism in order to maintain life
Amphibians	the process when water is removed from molecules in order to grow larger molecules
Invertebrates	The process by which green plants use sunlight to synthesize nutrients from carbon dioxide and water
Aquatic habitat	belonging to the very distant pass and no longer in existence
Waterway	relating to water natural home or environment of an animal, plant, or other organisms
Ancient	a river, canal, or other route for travel by water

2. Complete the following sentences:

1. All known forms of life depend on .....
2. Metabolism is the sum total of .....
3. In anabolism, water is removed from molecules in order to .....
4. In catabolism, water is used to .....
5. Photosynthetic cells use the sun's energy to .....
6. Amphibians spend portions of their lives in .....
7. Kelp and algae are the basis for .....
8. Aquatic vertebrates must obtain .....
9. Some amphibians are able to absorb oxygen through .....
10. In North Africa and the Middle East access to clean drinking water was a major factor .....

3. Answer the following questions:

1. Why water is vital for the living things?
2. What is a metabolism and what does it consist of?
3. What is the difference between the anabolism and catabolism?
4. What kind of animals spends portions of their lives in water and portions on land?
5. What is the role of plankton in the ocean food chain?
6. How do aquatic vertebrates obtain oxygen to survive?
7. How do invertebrates obtain oxygen to survive in poorly oxygenated waters?
8. Where did ancient people use to set up in early times?

4. Make up a summary of the text.

5. Put the verbs in to the correct form:

1. I (read) the newspaper when suddenly I (hear) a loud knock on the door.
2. You easily (find) this street?
3. I (phone) George an hour ago. He (do) his homework.

4. He (live) on the outskirts of a little town by the sea for a whole life.
5. The meeting (start) already when I (come)?
6. Where you (buy) such a lovely dress?
7. It usually (rain) at this time of year.
8. What your decision (depend on)?
9. They (not come), even though we (send) a special invitation.
10. It (to be) a good story, but I (hear) it before.

UNIT 3
WATER SUPPLY

Water Supply

Read and translate the following words and expressions:

public utilities, a system of pumps and pipes, improved water source, unprotected wells, a variety of locations, desalination, customer complaints, continuity, water quality, pressure, micro-biological, a physico-chemical dimension, to undergo treatment, a distribution system.

Water supply is the provision by public utilities, commercial organizations, community endeavors or by individuals of water, usually by a system of pumps and pipes. Irrigation is covered separately.

In 2010, about 84% of the global population (6,740 million people) had access to piped water supply through house connections or to an improved water source through other means than house, including standpipes, "water kiosks", protected springs and protected wells. However, more than 13% (884 million people) did not have access to an improved water source and had to use unprotected wells or springs, canals, lakes or rivers for their water needs.

Water supply systems get water from a variety of locations, including groundwater (aquifers), surface water (lakes and rivers), conservation and the sea through desalination. The water is then, in most cases, purified, disinfected through chlorination and sometimes fluoridated. Treated water then either flows by gravity or is pumped to reservoirs, which can be elevated such as water towers or on the ground. Once water is used, wastewater is typically discharged in a sewer system and treated in a wastewater treatment plant before being discharged into a river, lake or the sea or reused for landscaping, irrigation or industrial use.

Many of the 3.5 billion people having access to pipe water receive a poor or very poor quality of service, especially in developing countries where about 80% of the world population lives. Water supply service quality has many dimensions: continuity; water quality; pressure; and the degree of responsiveness of service providers to customer complaints.

Continuity of water supply is taken for granted in most developed countries, but is a severe problem in many developing countries, where sometimes water is only provided for a few hours every day or a few days a week. It is estimated that

about half of the population of developing countries receives water on an intermittent basis.

Drinking water quality has a microbiological and a physic-chemical dimension. There are thousands of parameters of water quality. In public water supply systems water should, at a minimum, be disinfected — most commonly, through the use of chlorination or the use of ultra violet light — or it may need to undergo treatment, especially in the case of surface water.

Water pressures vary in different locations of a distribution system. Water mains below the street may operate at higher pressures, with a pressure reducer located at each point where the water enters a building or a house. In poorly managed systems, water pressure can be so low as to result only in a trickle of water or so high that it leads to damage to plumbing fixtures and waste of water. Pressure in an urban water system is typically maintained either by a pressurized water tank serving an urban area, by pumping the water up into a tower and relying on gravity to maintain a constant pressure in the system or solely by pumps at the water treatment plant and repeater pumping stations.

The effective pressure also varies because of the supply resistance even for the same static pressure.

A great variety of institutions has responsibilities in water supply. A basic distinction is between institutions responsible for policy and regulation on the one hand; and institutions in charge of providing services on the other hand.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. commercial organizations	a. джерело води
2. a system of pumps and pipes	b. водопостачання
3. water supply	c. очисні споруди
4. a water source	d. система насосів і труб
6. surface water	f. промислове використання
7. to disinfect through chlorination	g. багато вимірювань
8. to discharge wastewater	h. низька якість сервісу
9. a treatment plant	i. поверхнева вода
10. industrial use	j. скарги клієнтів
11. a poor quality of service	k. дезінфікувати хлором
12. many dimensions	l. комерційні організації
13. customer complaints	m. зливати стічні води

2. Fill in the gaps in the sentences:

1. …… is the provision by public utilities usually by a system of pumps and pipes.
2. In 2010 …… people had access to piped water supply through house connections.
3. Water supply systems get water from a ……, including aquifers, lakes and rivers, conservation and the sea through desalination.

4. Many of the 3.5 billion people having …… receive a poor or very poor quality of service.
5. About 80% of …… lives in developing countries.

3. Answer the following questions:

1. How do public utilities, commercial organizations and community endeavors depend on water?
2. How does water usually distributed?
3. What percentage of the global population had access to piped water supply?
4. What are the main sources to get water from?
5. What is a purification of water?
6. What happens to sewage?
7. What is the treatment of public water supply systems water?
8. Which institutions have responsibilities in water supply?

4. Say if it is right:

1. Public utilities, commercial organizations, community endeavors depend on water supply.
2. Less than 13% of the global population had to use unprotected wells or springs, canals, lakes or rivers for their water needs.
3. Water we drink is always recycled.
4. The pressure of water is continuous in different places and locations.
5. In poorly managed systems, water pressure varies extremely.

5. Make up a summary of the text.

6. Insert the missing conjunctions and comment on the use of tenses in the following sentences (Conjunctions to be used: *when, till, before, after, as soon as, while, if****)***

1. I shall believe it …… I see it.
2. You must wait …… the light changes to green.
3. I shall be ready …… you count ten.
4. He will ring up for the taxi …… you finish packing.
5. I shall tell you a secret …… my brother goes out.
6. We shall be starting immediately …… you finish your dinner.
7. I don't think he will write …… he arrives.
8. I shall always remember you …… I live.
9. I shall be preparing breakfast …… you are taking a shower.
10. I shall put on my raincoat …… it starts to rain.
11. He'll tell you …… you ask him.
12. …… you stay in the reading-hall I'll be working in the laboratory.
13. He will stay here …… you come.
14. …… they show me their homework, I will correct it.

Water Supply and Sanitation

Read and translate the following words and expressions:

Households, morbidity, mortality, water-related diseases, the installation of piped water supply, expand small enterprises, the benefits of such services, escape from their families' poverty, changes in behavior and attitudes, water resources management , sustainable service

Households with improved services suffer less morbidity and mortality from water-related diseases. The benefits would include an average global reduction of 10 % in diarrheal episodes. Health-related costs avoided would reach $7.3 billion per year and the annual global value of adult working days gained because of less illness would rise to almost $750 million.

Better services resulting from the relocation of a well or borehole to a site closer to user communities, the installation of piped water supply in houses, and latrines closer to home yield significant time savings. The availability of water can be used to start or expand small enterprises and thus increase disposable household income. At the national level, demand for agricultural products increased, and tourism may develop.

The benefits of such services will vary across regions. The worse unserved and the more touched by disease the region, the greater the benefits from improved services.

From the age of 0 to 4 years, the cruel toll of child mortality may be reduced. From the age of 5 to 14 years, far more children, especially girls, could go to school if they had adequate drinking water and sanitation facilities. It would enable children to escape from their families' poverty.

From the age of 15 to 59 years, productivity gains would be achieved with improved water and sanitation facilities.

People older than 60 could expect to live longer.

With 10 years to go until 2015, a dramatic increase in access to safe drinking water and basic sanitation services for poor women, men, and children in developing countries will be required. Changes in behavior and attitudes, particularly with regard to hygiene, are also a prerequisite.

Countries must ensure that policies and institutions for water supply and sanitation service delivery, as well as for water resources management and development, respond equally to the different roles, needs, and priorities of women and men.

Governments and donor agencies must simultaneously pursue investment and reforms. Efforts to reach the water and sanitation target must focus on sustainable service delivery, rather than construction of facilities alone. Governments and donor agencies must empower local authorities and communities with the authority, resources, and professional capacity required to manage water supply and sanitation service delivery.

Governments and utilities must ensure that users who can pay do pay in order to fund the maintenance and expansion of services – but they must also ensure that the needs of poor households are met.

Governments and their civil society and private sector partners must support a wide range of water and sanitation technologies and service levels that are technically, socially, environmentally, and financially appropriate. Institutional, financial, and technological innovation must be promoted in strategic areas.

The United Nations system organizations and their member states must ensure that the UN system and its international partners provide strong and effective support for the achievement of the water supply and sanitation target and for water resources management and development.

1. Answer the questions:

1. How the availability of water would improve life at all ages?
2. Would it contribute to tourism development?
3. How the Governments may favour the development of water supply and sanitation service delivery?
4. In what way the United Nations system organizations and their member can participate in the achievements of the water supply and sanitation?

2. Make a short summary of the text.

Water Supply Network

Read and translate the following words and expressions:

water supply network, hydrologic and hydraulic components, to accumulate water, an underground aquifer, to be transferred, a pipe network for distribution of water, fire hydrants, outbreaks of toxic algae, a separate system

A water supply system or water supply network is a system of engineered hydrologic and hydraulic components which provide water supply. A water supply system typically includes:

A raw (untreated) water collection point (above or below ground) where the water accumulates, such as a lake, a river, or groundwater from an underground aquifer. Untreated drinking water may be transferred using uncovered ground-level aqueducts, covered tunnels or underground water pipes.

Treated water is transferred using water pipes (usually underground).

Smaller water systems may store the water in cisterns or pressure vessels. Additional water pressurizing components such as pumping stations may need to be situated at the outlet of underground or above ground reservoirs or cisterns.

A pipe network for distribution of water to the consumers (which may be private houses or industrial, commercial or institution establishments) and other usage points (such as fire hydrants).

Connections to the sewers (underground pipes, or aboveground ditches in some developing countries) are generally found downstream of the water

consumers, but the sewer system is considered to be a separate system, rather than part of the water supply system.

Raw water is collected from a surface water source or from a groundwater source within the watershed that provides the water resource.

Shallow dams and reservoirs are susceptible to outbreaks of toxic algae, especially if a hot sun warms the water. The bacteria grow from storm water runoff carrying fertilizer into the river where it acts as a nutrient for the algae. Such outbreaks render the water unfit for human consumption.

The raw water is transferred to the water purification facilities using uncovered aqueducts, covered tunnels or underground water pipes.

1. Find the Ukrainian equivalents in the right – hand column for the following:

1. a water supply system	a. мережі водопостачання
2. a water supply network	b. дрібні дамбі і резервуари
3. untreated drinking water	c. добриво
4. the sewers	d. необроблена питна вода
5. raw water	e. поживні речовини
6. shallow dams and reservoirs	f. токсичні водорості
7. toxic algae	g. пристрої для водоочищення
8. a fertilizer	h. споживання людиною
9. a nutrient	i. підземні водопровідні труби
10. a human consumption	j. сира вода
11. water purification facilities	k. стічні трубі
12. underground water pipes	l. система водопостачання

2. Complete the sentences:

1. A water supply system or water supply network is a system of .....
2. Additional water pressurizing components such as pumping stations may need to be .....
3. Connections to the sewers (underground pipes, or aboveground ditches in some developing countries) are generally .....
4. The raw water is transferred to .....
5. The bacteria grow from .....
6. Untreated drinking water may be transferred using .....
7. The sewer system is considered to be .....
8. Additional water pressurizing components such as .....

3. Translate what is given in brackets, using the Present Indefinite or the Future Indefinite.

1. You will enjoy yourself if you (поїдете у Канаду).
2. Ask him if he (поїде до Китаю).
3. We shan't be able to go out if (буде сильний дощ).
4. They say (буде сильний дощ) at night, the clouds are gathering.
5. I don't know when he (прийде), the weather is so nasty.

6. Tell him to wait when he (прийде), I may be late.
7. Tell mother we (нескоро повернемося), it's much too far away.
8. Tell mother not to worry if we (не скоро повернемося), it's much too far away.
9. I'll talk to him about it if I (побачу його сьогодні).
10. I'm not sure if I (побачу його сьогодні).
11. She will take the children out for a walk if she (закінчить роботу раніш).
12. I don't know if she (закінчить роботу раніш), she has got a lot to do.
13. The rain won't do him any harm if he (одягне плащ).
14. Ask him if he (одягне плащ), it looks like rain.

Potable Water Supply

Read and translate the following words and expressions:

several possible sources, domestic water systems, waste water, domiciles, the largest killer of humans, a contamination of drinking water, the various fixtures and appliances, waste/sewage components .

This supply may come from several possible sources: municipal water supply, water wells, delivered by truck, processed water from creeks, streams, rivers, lakes, rainwater.

Domestic water systems have been evolving since people first located their homes near a running water supply, a stream or river. The water flow also allowed sending wastewater away from the domiciles.

Modern indoor plumbing delivers clean, safe, potable water to each service point in the distribution system. It is imperative that the clean water not be contaminated by the wastewater side of the process system. Historically, this contamination of drinking water has been the largest killer of humans.

Domestic hot water is provided by means of water heater appliances, or through district heating. The hot water from these units is then piped to the various fixtures and appliances that require hot water, such as lavatories, sinks, bathtubs, showers, washing machines, and dishwashers.

Everything in a building that uses water falls under one of two categories; Fixture or Appliance. As the consumption points above perform their function, most produce waste/sewage components that will require removal by the waste/sewage side of the system.

Make up a summary of the text.

History of Water Using

Read and translate the following words and expressions:

to devise systems, to make getting and using water more convenient, indoor plumbing, London water supply infrastructure, the technique of purification, the Army Medical School, the basis for present day systems, municipal water purification.

Throughout history, people have devised systems to make getting and using water more convenient. Early Rome had indoor plumbing, meaning a system of aqueducts and pipes that terminated in homes and at public wells and fountains for people to use. London water supply infrastructure developed over many centuries from early mediaeval conduits, through major 19th century treatment works built in response to cholera threats, to modern large-scale reservoirs.

The technique of purification of drinking water by use of compressed liquefied chlorine gas, was developed in 1910 by U.S. Army Major Carl Rogers Darnall (1867-1941), Professor of Chemistry at the Army Medical School. Shortly thereafter, Major William J. L. Lyster (1869-1947) of the Army Medical Department used a solution of calcium hypochlorite in a linen bag to treat water. For many decades, Lyster's method remained the standard for U.S. ground forces in the field and in camps, implemented in the form of the familiar Lyster Bag. Darnall's work became the basis for present day systems of municipal water 'purification'. This section requires expansion.

International standards for water supply system are covered by International Classification of Standards.

1. ***Tell about the Carl Rogers Darnall's role in the improvement of water purification technique.***
2. ***Make up a summary of the text.***

Human Uses

Read and translate the following words and expressions:

to function properly, to avoid dehydration; the level of activity, temperature, humidity, and other factors; to be ingested through foods or beverages, to maintain proper hydration, a lower consumption, to fluid loss from exercise or warm weather, risk of water intoxication, the propensity of water to form solutions and emulsions, effect of water on weight loss, to contain too many impurities

The human body is anywhere from 55% to 78% water depending on body size. To function properly, the body requires between one and seven liters of water per day to avoid dehydration; the precise amount depends on the level of activity,

temperature, humidity, and other factors. Most of this is ingested through foods or beverages other than drinking straight water.

It is not clear how much water intake is needed by healthy people, though most advocates agree that 6–7 glasses of water (approximately 2 liters) daily is the minimum to maintain proper hydration. Medical literature favors a lower consumption, typically 1 liter of water for an average male, excluding extra requirements due to fluid loss from exercise or warm weather. For those who have healthy kidneys, it is rather difficult to drink too much water, but (especially in warm humid weather and while exercising) it is dangerous to drink too little. People can drink far more water than necessary while exercising, however, putting them at risk of water intoxication, which can be fatal. The popular claim that "a person should consume eight glasses of water per day" seems to have no real basis in science. Similar misconceptions concerning the effect of water on weight loss and constipation have also been dispelled.

The latest dietary reference intake report by the United States National Research Council in general recommended (including food sources): 2.7 liters of water total for women and 3.7 liters for men. Also noted is that normally, about 20% of water intake comes from food, while the rest comes from drinking water and beverages.

Humans require water that does not contain too many impurities. Common impurities include metal salts and oxides (including copper, iron, calcium and lead) and/or harmful bacteria. Some solutes are acceptable and even desirable for taste enhancement and to provide needed electrolytes.

The propensity of water to form solutions and emulsions is useful in various washing processes. Many industrial processes rely on reactions using chemicals dissolved in water, suspension of solids in water slurries or using water to dissolve and extract substances. Washing is also an important component of several aspects of personal body hygiene.

Humans use water for many recreational purposes, as well as for exercising and for sports. Some of these include swimming, waterskiing, boating, surfing and diving. In addition, some sports, like ice hockey and ice skating, are played on ice. Lakesides, beaches and water parks are popular places for people to go to relax and enjoy recreation. Many find the sound and appearance of flowing water to be calming, and fountains and other water features are popular decorations. Some keep fish and other life in aquariums or ponds for show, fun, and companionship. Humans also use water for snow sports i.e. skiing, sledding, snowmobiling or snowboarding, which requires the water to be frozen. People may also use water for play fighting such as with snowballs, water guns or water balloons.

1. Say if these sentences are true or false:

1. The human consumption of water doesn't depend on body size at all.
2. The amount of water recommended to use is absolutely equal for both men and women.
3. Most of the water you need is ingested through drinking water.

4. It is dangerous to drink too little.
5. About 50% of water intake comes from drinking water and beverages.
6. The most poisonous impurities include copper, iron, calcium and lead.
7. Many industrial enterprises totally rely on water.
8. Humans like to use water for many recreational purposes.
9. Water plays an important role in the body hygiene.

2. Fill in the gaps:

1. To avoid dehydration the body requires …… of water per day.
2. It is rather difficult to drink too much water for those who have …….
3. Some solutes are …… and even …… for taste enhancement and to provide needed electrolytes.
4. …… rely on reactions using chemicals dissolved in water, suspension of solids in water slurries or using water to dissolve and extract substances.
5. Some of …… include swimming, waterskiing, boating, surfing and diving.
6. Many find the sound and appearance of …… to be calming.
7. Some keep fish and other life in …… for show, fun, and companionship.

3. Answer the following questions:

1. What does the water percentage in human body depend on?
2. How much water a day does the human body need to function properly?
3. In what way do the level of activity, temperature, humidity, and other factors effect on the amount of water you need?
4. What do you think about the effect of water on weight loss?
5. What are the common impurities dissolved in water?
6. What are the purposes humans use water for?
7. How can we use water for recreational purposes?

4. Make up a summary of the text.

5. Correct mistakes in the following sentences:

1. I doesn't understand you.
2. He doesn't recognize me.
3. Are you an architect?
4. Has you many friends here?
5. What time does you have breakfast?
6. I begin to learn English yesterday.
7. I finished school in 1990.
8. The teacher are explaining a grammar rule.
9. The man was reading the magazine when somebody knocked the door.

10. I had posted the letter by three o'clock.
11. He said that he is finished school.
12. The students had translated the text before the bell rang.
13. Peter had studied English before he entered the institute.
14. America will be discovered by Columbus.

Water Industry

Read and translate the following words and expressions:

wastewater services, water supply facilities, rainwater harvesting, water purification facilities, atmospheric water generators, to be collected at springs, rainwater collection, undissolved substances, abundant seawater, coastal arid climates, municipal water systems, market costs, the private firms' profits, local population, to bioaccumulate, biodegradable

The water industry provides drinking water and wastewater services to households and industry. Water supply facilities include water wells cisterns for rainwater harvesting, water supply network, water purification facilities, water tanks, water towers, water pipes including old aqueducts. Atmospheric water generators are in development.

Water may require purification for human consumption. This may involve removal of undissolved substances, dissolved substances and harmful microbes. Popular methods are filtering with sand which only removes undissolved material, while chlorination and boiling kill harmful microbes. Distillation does all three functions. More advanced techniques exist, such as reverse osmosis. Desalination of abundant seawater is a more expensive solution used in coastal arid climates.

The distribution of drinking water is done through municipal water systems, tanker delivery or as bottled water. Governments in many countries have programs to distribute water to the needy at no charge. Others argue that the market mechanism and free enterprise are best to manage this rare resource and to finance the boring of wells or the construction of dams and reservoirs.

Reducing usage by using drinking (potable) water only for human consumption is another option. In some cities such as Hong Kong, sea water is extensively used for flushing toilets citywide in order to conserve fresh water resources.

Polluting water may be the biggest single misuse of water; to the extent that a pollutant limits other uses of the water, it becomes a waste of the resource, regardless of benefits to the polluter. Like other types of pollution, this does not enter standard accounting of market costs, being conceived as externalities for which the market cannot account. Thus other people pay the price of water pollution, while the private firms' profits are not redistributed to the local population victim of this pollution. Pharmaceuticals consumed by humans often end up in the waterways and can have detrimental effects on aquatic life if they bio accumulate and if they are not biodegradable.

Wastewater facilities are storm sewers and wastewater treatment plants. Another way to remove pollution from surface runoff water is bios wale.

Water is used in power generation. Hydroelectricity is electricity obtained from hydropower. Hydroelectric power comes from water driving a water turbine connected to a generator. Hydroelectricity is a low-cost, non-polluting, renewable energy source. The energy is supplied by the sun. Heat from the sun evaporates water, which condenses as rain in higher altitudes, from where it flows down.

Water is also used in many industrial processes and machines, such as the steam turbine and heat exchanger, in addition to its use as a chemical solvent. Discharge of untreated water from industrial uses is pollution. Pollution includes discharged solutes (chemical pollution) and discharged coolant water (thermal pollution). Industry requires pure water for many applications and utilizes a variety of purification techniques both in water supply and discharge.

Water plays many critical roles within the field of food science. It is important for a food scientist to understand the roles that water plays within food processing to ensure the success of their products.

Solutes such as salts and sugars found in water affect the physical properties of water. The boiling and freezing points of water are affected by solutes, as well as air pressure, which is in turn affected by altitude. Water boils at lower temperatures with the lower air pressure, which occurs at higher elevations.

Solutes in water also affect water activity, which affects many chemical reactions and the growth of microbes in food. Water activity can be described as a ratio of the vapor pressure of water in a solution to the vapor pressure of pure water. Solutes in water lower water activity. This is important to know because most bacterial growth ceases at low levels of water activity. Not only does microbial growth affect the safety of food but also the preservation and shelf life of food.

Water hardness is also a critical factor in food processing. It can dramatically affect the quality of a product as well as playing a role in sanitation. Water hardness is classified based on the amounts of removable calcium carbonate salt it contains per gallon.

Boiling, steaming and simmering are popular cooking methods that often require immersing food in water or its gaseous state, steam. Water is also used for dishwashing.

1. Match the words with their definitions:

1. distillation	a. climate having little or no rain
2. arid climates	b. electricity obtained from hydropower
3. chlorination	c. purification by heating it so that it vaporizes, then cooling and condensing the vapour and collecting the resulting liquid
4. renewable	d. capable of being decomposed by bacteria or other living organisms and thereby avoiding pollution

5. hydroelectricity	e. treating with chlorine
6. aqueduct	f. a source of energy that is not depleted when used
7. abundant	g. a bridge carrying a waterway over a valley
8. biodegradable	h. existing or available in large quantities
9. desalination	i. the action of using up a resource by humans
10. human consumption	j. removing salt from water

2. Answer the questions:

1. What is water purification?
2. What is chlorination?
3. What is distillation?
4. What is the most popular method to purify water?
5. What is the most advanced technique to purify water?
6. What wastewater facilities do you know?
7. What do you think about hydroelectricity? Is it one of the most perspective energy sources? Why?
8. What is the difference between the renewable and nonrenewable resources? Which renewable resources do you know?
9. How water properties can effect food processing?
10. Where and what for do you use water at home?

3. Complete the sentences:

1. Water supply facilities include .....
2. Water purification for human consumption may involve .....
3. Filtering with sand removes .....
4. Chlorination and boiling kill .....
5. Distillation is .....
6. Reverse osmosis is one of .....
7. Desalination of abundant seawater is used in .....
8. The distribution of drinking water is done through .....
9. Some cities such as Hong Kong use seawater to .....
10. Pollution is .....
11. Pollution includes .....
12. Industry requires pure water for .....
13. Industry utilizes .....
14. Water hardness can dramatically affect .....
15. Popular cooking methods are .....

4. Make up the plan for the text.

5. Put the verbs into the correct tense:

1. John always (travel) a lot.
2. In fact, when he was only two years old he first (fly) to the US.
3. His mother (to be) Italian and his father (to be) American.

4. John (to bear) in France, but his parents (meet)in Cologne, Germany after they (live) there for five years.
5. They (meet) one day while John's father (read) a book in the library and his mother (sit) down beside him.
6. Anyway, John (travel) a lot because his parents also (travel) a lot.
7. As a matter of fact, John (visit) his parents in France at the moment.
8. He (live) in New York now, but (visit) his parents for the past few weeks.
9. He really (enjoy) living in New York, but he also (love) coming to visit his parents at least once a year.

UNIT 4
WATER TREATMENT

Water Treatment

Read and translate the following words and expressions:

global, state and federal agencies, the World Health Organization (WHO) or the United States Environmental Protection Agency, Water treatment, Water purification, to reduce pumping costs, chlorine, to kill bacteria effectively, underground pipes, water distribution, to protect the water supply; constructed of plastic, ferrous, or concrete circular pipe; square or rectangular concrete boxes, arched brick pipe, or wood; gravity, a water source, small domestic systems, a water reserve

Virtually all large systems must treat the water; a fact that is tightly regulated by global, state and federal agencies, such as the World Health Organization (WHO) or the United States Environmental Protection Agency. Water treatment must occur before the product reaches the consumer and afterwards. Water purification usually occurs close to the final delivery points to reduce pumping costs and the chances of the water becoming contaminated after treatment.

Traditional surface water treatment plants generally consist of three steps: clarification, filtration and disinfection. Clarification refers to the separation of particles (dirt, organic matter) from the water stream. Chemical addition destabilizes the particle charges and prepares them for clarification either by settling or floating out of the water stream. Sand, anthracite or activated carbon filters refine the water stream, removing smaller particulate matter. While other methods of disinfection exist, the preferred method is via chlorine addition. Chlorine effectively kills bacteria and most viruses and maintains a residual to protect the water supply through the supply network.

Most water distribution happens through underground pipes. Pressurizing the water is required between the small water reserve and the end-user. The product, delivered to the point of consumption, is called fresh water if it receives little or no treatment or drinking water if the treatment achieves the water quality standards required for human consumption.

Once treated, chlorine is added to the water and it is distributed by the local supply network. Today, water supply systems are typically constructed of plastic, ferrous, or concrete circular pipe. However, other "pipe" shapes and material may be used, such as square or rectangular concrete boxes, arched brick pipe, or wood.

The energy that the system needs to deliver the water is called pressure. That energy is transferred to the water, therefore becoming water pressure, in a number of ways: by a pump, by gravity feed from a water source (such as a water tower) at a higher elevation, or by compressed air.

In small domestic systems, the water may be pressurized by a pressure vessel or even by an underground cistern. This eliminates the need of a water tower or any other heightened water reserve to supply the water pressure.

These systems are usually owned and maintained by local governments, such as cities, or other public entities, but are occasionally operated by a commercial enterprise. Water supply networks are part of the master planning of communities, counties, and municipalities. Their planning and design requires the expertise of city planners and civil engineers, who must consider many factors, such as location, current demand, future growth, leakage, pressure, pipe size, pressure loss, fire fighting flows — using pipe network analysis and other tools. Construction comparable sewage systems, was one of the great engineering advances that made urbanization possible. Improvement in the quality of the water has been one of the great advances in public health.

As water passes through the distribution system, the water quality can degrade by chemical reactions and biological processes. Corrosion of metal pipe materials in the distribution system can cause the release of metals into the water with undesirable aesthetic and health effects. Release of iron from unlined iron pipes can result in customer reports of "red water" at the tap. Release of copper from copper pipes can result in customer reports of "blue water" and/or a metallic taste. Release of lead can occur from the solder used to join copper pipe together or from brass fixtures. Copper and lead levels at the consumer's tap are regulated to protect consumer health.

Utilities will often adjust the chemistry of the water before distribution to minimize its corrosiveness. The simplest adjustment involves control of pH and alkalinity to produce water that tends to passivity corrosion by depositing a layer of calcium carbonate. Corrosion inhibitors are often added to reduce release of metals into the water. Common corrosion inhibitors added to the water are phosphates and silicates.

Maintenance of a biologically safe drinking water is another goal in water distribution. Typically, a chlorine based disinfectant, such as sodium hypochlorite or monochloramine is added to the water as it leaves the treatment plant. Booster stations can be placed within the distribution system to ensure that all areas of the distribution system have adequate sustained levels of disinfection.

Like electric power lines, roads, and microwave radio networks, water systems may have a loop or branch network topology, or a combination of both.

The piping networks are circular or rectangular. If any one section of water distribution main fails or needs repair, that section can be isolated without disrupting all users on the network.

Most systems are divided into zones. Factors determining the extent or size of a zone can include hydraulics, telemetry systems, history, and population density. Sometimes systems are designed for a specific area then are modified to accommodate development. Terrain affects hydraulics and some forms of telemetry. While each zone may operate as a stand-alone system, there is usually some arrangement to interconnect zones in order to manage equipment failures or system failures.

Water supply networks usually represent the majority of assets of a water utility.

1. Answer the questions:

1. What are the well-known agencies that tightly regulate the treatment of water?
2. What are the three steps of the water treatment plants?
3. What is clarification?
4. What is filtration?
5. What is disinfection?
6. What materials are water pipes made of today?
7. What is pressure?
8. What role city planners and civil engineers play in constructing municipal water supply system?
9. How the materials used in the building of pipes effect the water quality?
10. What are factors determining the extent or size of a water supply and distribution zone?

2. Complete the sentences:

1. The World Health Organization (WHO) or the United States Environmental Protection Agency are organizations which .....
2. Traditional surface water treatment plants generally consist of .....
3. Clarification is the .....
4. Filtration is .....
5. The preferred method of purification is .....
6. Chlorine effectively kills .....
7. Fresh water is .....
8. Drinking water is .....
9. Pressure is .....
10. Planners and civil engineers must consider .....
11. Construction comparable sewage systems made urbanization .....
12. Phosphates and silicates are .....
13. The form of piping networks can be .....
14. Sometimes water supply and distribution systems are designed for .....

15. Corrosion of metal pipe materials in the distribution system can cause .....

3. Make up a short summary of the text.

4. Put the verbs into the correct tense:

1. This year he (fly) over 50,000 miles for his job.
2. He (work) for Jackson & Co. for almost two years now.
3. He's pretty sure that he (work) for them next year as well.
4. His job (require) a lot of travel.
5. In fact, by the end of this year, he (travell) over 120,000 miles!
6. His next journey (to be) to Australia.
7. He really (not like) going to Australia because it is so far.
8. This time he is going (to fly) from Paris after a meeting with the company's French partner.
9. He (sit) for over 18 hours by the time he arrives! John (talk) with his parents earlier this evening when his girlfriend from New York (telephone) to let him know that Jackson & Co. (decide) to merge with a company in Australia.
10. The two companies (negotiate) for the past month, so it really (not to be) much of a surprise.
11. Of course, this (mean) that John will have to catch the next plane back to New York.
12. He (meet) with his boss at this time tomorrow.

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